Patent Claims

1. Data transmission network having
a least one line termination device (2) connected via a data
transmission medium (7) to several network termination
devices (8), each network termination device (8) comprising
a request message generator (33) for generating a data
transmission request message when a data communication device
(9) connected to the network termination device (8) is
sending data, and
an xDSL transceiver (20) for transmitting an upstream data
frame including the generated request message via the data
transmission medium (7) to the line termination device (2),
said line termination device (2) comprising
a selection unit (66) for selecting network termination
devices (8) which have sent a request message depending on
stored status information data of the network termination
devices (8),
a grant message generator (68) for generating data
transmission grant messages for the selected network
termination devices (8), and
an xDSL transceiver (20) for broadcasting downstream data
frames including the generated grant messages via the data
transmission medium (7) to the network termination devices
(8).

2. Data transmission network according to claim 1, wherein
the transmission medium is a telephone line.

3. Data transmission network according to claim 1 or 2,
wherein a data transmission request message comprises
a request message opcode and a number of time slots required
for data transmission of the data sent by the data
communication device (9).

4. Data transmission network according to one of the preceding claims, wherein a data transmission grant message comprises

a grant message opcode, and

5   an address of the selected network termination device.

5. Data transmission network according to one of the preceding claims, wherein

the upstream data frames are sent from the network

10   termination devices (8) to the line termination device (2) via the data transmission medium (7) in an upstream frequency band, and

the downstream data frames are sent from the line termination device (2) to the network termination device (8) via the data

15   transmission medium (7) in a downstream frequency band.

6. Data transmission network according to one of the preceding claims, wherein

the downstream frequency band ranges between 1 and 3 MHz and

20   the upstream frequency band ranges between 4 and 8 MHz.

7. Data transmission network according to one of the preceding claims, wherein each line termination device (2) comprises an MII interface (50) for the connection to a

25   switch (4).

8. Data transmission network according to one of the preceding claims, wherein each data frame comprises:

a synchronization data field,

30   a message data field,

a payload data field, and

an error correction data field.

9. Data transmission network according to one of the

35   preceding claims, wherein each network termination device (8) is connected to a passive signal splitter.

10. Data transmission network according to one of the preceding claims, wherein the passive signal splitter comprises

a low-pass filter (19-i) for filtering a telephone signal, and

a high-pass filter (12-i) for filtering an xDSL data signal.

11. Data transmission network according to one of the preceding claims, wherein the line termination device (2) comprises

storing means (48) for storing the status information data of the different network termination devices (8) connected to the line termination device (2).

12. Data transmission network according to one of the preceding claims, wherein the storing means (48) stores the addresses of the network termination devices (8) and the corresponding numbers of the required time slots received from the network termination devices (8) in request messages.

13. Data transmission network according to one of the preceding claims, wherein the selection unit (66) reads the status information data stored in the storing means (48), selects the network termination devices for data transmission according to a programmed selection algorithm and activates the grant message generator (68) for generating grant messages for the selected network termination devices (8).

14. Data transmission network according to one of the preceding claims, wherein the xDSL transceiver (20) of the line termination device (2) includes an adaptive automatic gain control circuit (32) and an equalizer (38).

15. Data transmission network according to one of the preceding claims, wherein the line termination device (2) comprises

a first storing means (73) for storing the AGC coefficients for the network termination devices (8) connected to the line termination device (2), and
a second storing means (74) for storing equalizer
5   coefficients for the network termination devices (8) connected to the line termination device (2).

16. Data transmission network according to one of the preceding claims, wherein the AGC coefficients of the
10   selected network termination device selected by the selecting unit (66) are loaded into the AGC circuit (32) of the xDSL transceiver (20) of the line termination device (2).

17. Data transmission network according to one of the
15   preceding claims, wherein the equalizer coefficients of the selected network termination device (8) selected by the selecting unit (66) are loaded into the equalizer (38) of the xDSL transceiver (20) of the line termination device (2).

20   18. Data transmission network according to one of the preceding claims, wherein the network termination device (8) comprises a grant decoder (86) for decoding messages within downstream data frames broadcasted by the line termination device (2).
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19. Data transmission network according to one of the preceding claims, wherein the xDSL transceivers (20) are VDSL transceivers.

30   20. Data transmission network according to one of the preceding claims, wherein the impedances of the network termination devices (8) connected to the data transmission medium (7) are balanced.

35   21. Data transmission network according to one of the preceding claims, wherein eight network termination devices

are connected via the data transmission medium (7) to the
line termination device (8).

22. Data transmission network according to one of the
preceding claims, wherein several line termination devices
(2) are connected to a switch (4).

23. Data transmission network according to one of the
preceding claims, wherein the switch (4) is connected to an
IP backbone (5).

24. Method for data transmission comprising the following
steps:
(a) generating a data transmission request message by a
network termination device (8) when the network termination
device receives data from a connected data communication
device (9);
(b) transmitting the generated data transmission request
message within an upstream data frame via a data transmission
medium (7) to a line termination device (2);
(c) selecting the network termination devices (8) depending
on stored status information data of the network termination
devices;
(d) generating data transmission grant messages for the
selected network termination devices (8) by the line
termination device (2);
(e) broadcasting downstream data frames containing the
generated grant messages via the data transmission medium (7)
to the connected network termination devices (8);
(f) transmitting data from the selected network termination
device (8) after the grant message has been decoded.

25. Line termination device comprising
a selection unit (66) for selecting a network termination
device (8) from a group of network termination devices
connected to the line termination device (2) in response to a

request message depending on stored status information data
of the network termination devices;
a grant message generator for generating data transmission
grant messages for the selected network termination device
5   (8), and
an xDSL transceiver (20) for broadcasting downstream data
frames including the generated grant messages via a data
transmission medium (7) to the network termination devices
(8).
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26. Network termination device comprising
a request message generator (83) for generating a data
transmission request message when a data communication device
(9) connected to the network termination device (8) is
15 sending data, and
an xDSL transceiver (20) for transmitting an upstream data
frame including the generated request message via the data
transmission medium (7) to a connected line termination
device (2).